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On the Relation of the Carlisle Table to the Government, the Registrar-General's, and other Tables of Mortality. By JARDINE HENRY, Esq.

[Read before the Institute, 30th March, 1863, and printed in abstract by order of the Council.]

THE paper commenced with a general view of the effect of emigration upon returns of deaths among the population of England and Wales, followed by an estimate of the extent to which any calculations based upon such returns, and the general census, must be thereby affected. This was followed up by some remarks on the uncertainty attending the statements of ages of the individuals enumerated in the census returns, and the ages returned as at death. A tabular view of the estimated effect of these causes of error upon the expectation of life, derived from the returns, was also given. A comparison was then made, also in a tabular form, between the expectation of life by the Registrar-General's observations (English Life Table, No. 1) and the tables for Sweden and Finland calculated by the late Mr. Milne. The above applied to males, and the effect of the same influences upon the female life tables was then shown in a similar way, and some general remarks were made upon the more striking points arising from the comparison. The experience of the Ministers' Widows' Fund of the Church of Scotland was then contrasted with the English Life Table, No. 1, both in the original form of the latter, and also as sought to be corrected by the writer of the article. The particulars in which the two sets of tables resembled or differed from each other were then commented upon, and the general causes that influence the former table were referred to. The result, on the average, was stated to be, that the ministers of the Established Church of Scotland do not appear to have a much better expectation of life than the general male population of England and Wales—a result which was held by the writer as a further proof of the inaccuracy of the returns from which the English Life Table, No. 1, has been compiled. The rate of mortality prevailing among the widows of the ministers was then adverted to, and its relation to that of the Government females pointed out, and the probable causes of the difference were given. The result of the comparison by *persons* between the two sets of observations was stated to be their identity in expectation of life. The Carlisle table of mortality was then considered, and the grounds upon which a great amount

of reliance has been reposed in that table were stated. The table of the experience of the Equitable Society was also referred to, and the true relation in which it stands to the Carlisle table in the respective elements of both was discussed. A comparison was also made here between the expectation of life of the *persons* in the Government tables and the Carlisle, and a table, which shows the difference to be quite immaterial, was subjoined. The paper further remarked on the extent of superiority of female over male longevity, as brought out in the various tables referred to in the article, and concluded with a few observations on the rate of mortality prevalent in this country during the past and present century.

On certain Methods proposed for the Valuation of the Liabilities of a Life Assurance Company. By THOMAS BOND SPRAGUE, M.A.,
Actuary of the Equity and Law Life Assurance Society.

[Read before the Institute, 27th April, 1863, and printed by order of the Council.]

THE most important practical question arising in an actuary's practice is the following—"By what table of mortality, and according to what process, should the liabilities of a Life Assurance Company be estimated?" Very wide differences of opinion appear to exist as to the proper answer to be given to this question. Thus, in the *Assurance Magazine* for January last, are contained two papers, written respectively by Mr. Jellicoe and Mr. Tucker, which bear more or less upon this subject; and in which very conflicting opinions are expressed by those experienced actuaries. It is not my intention now to enter upon the very wide questions, incidentally discussed there, as to the proper rate of interest to adopt in valuations; or as to the propriety of bringing the gross premiums into account rather than the net premiums. But I hope to throw a new light on some of the points discussed in those papers, and to reconcile some of the statements contained in them which appear at first sight contradictory, by means of independent mathematical investigation.

It is also my intention to consider with some minuteness the particular method of valuation advocated by Mr. Tucker—*i.e.*, the method that values the premiums actually payable by means of a hypothetical table of annuities, derived by an inverse process from the Office premiums. For brevity, I will speak of this method as the "hypothetical method" of valuation; and will distinguish the